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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/683,303	12/11/2001	Robert M. Hilton	MTB001US	1419

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PATENT LAW OFFICES OF DAVID MILLERS  
6560 ASHFIELD COURT  
SAN JOSE, CA 95120

EXAMINER
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MITCHELL, JAMES M

ART UNIT	PAPER NUMBER
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2827

DATE MAILED: 08/01/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/683,303

Applicant(s)

HILTON ET AL.

Examiner

James Mitchell

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 11 December 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-17 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-7, 9-11 and 13-17 is/are rejected.
- 7) ☒ Claim(s) 8 and 12 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

### DETAILED ACTION

1. This office action is in response to the application filed December 11, 2001.

#### ***Specification***

2. The disclosure is objected to because of the following informalities: Applicant references in Paragraph 0026, Line 2 a wetting angle by a variable (hereinafter referenced as  $\angle$ ) which does not exist in the figures. The prior art Fig 1B shows  $\angle$  but does not show  $\angle$  as indicated in the paragraph nor is there a wetting angle  $\angle$  in relation to dam 240 as indicated in Line 3.

Appropriate correction is required.

3. In regard to claim 13, there appears to be grammatical errors in the phrases "...substrate *to from in* the.." in the second line and "die *attaches the in the* depression" in the fifth line.

#### ***Claim Rejections - 35 USC § 112***

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 1-3, 13, 14 and 15 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.
6. In regards to claim 1, the term underfill is ambiguous, because the region not covered by a die is not functioning in the capacity of an underfill.
7. In regards to claims 2,3,14 and 15, it unclear as to what other surface is referenced with the die to establish a wetting angle.

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8. In regards to claim 13, it is ambiguous as to what is being attached in the depression.

***Claim Rejections - 35 USC § 102***

9. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless —

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

10. Claims 1-4, 6-9, 12-16 rejected under 35 U.S.C. 102(b) as being anticipated by Jones (U.S 5,541,450).

11. Jones (Fig 5; Column 6, Lines 38-67) discloses a packaged device and a method for packaging comprising: attaching a die (18; via direct chip attachment) to a support substrate (122) having conductive traces (124) wherein the die has contacts (136) formed on a major surface of the die, the die being placed so that the contacts electrically contact the conductive traces of the substrate, an inherent dam (121; confines encapsulant to a set space) formed by removing a portion of an additional substrate (121) attached to the support substrate to form a depression with said dam as a wall surrounding depression (121; Column 3, Lines 9-11) and applying a liquid underfill ("encapsulant"); claim 10) that inherently fills a gap between the die and the substrate and a volume between said die and dam, wherein the dam confines and shapes an edge of the underfill, said underfill inherently has a wetting angle at the die and dam that is less than 45° (a top portion of said dam and die to a surface of said

underfill is substantially planar), said dam inherently positioned about twice a pitch (a particular level) of a ball grid array on the substrate.

12. In regards to claims 8 and 12, the substrate has an inherent treated region (portion of substrate that dam is formed on) that confines and shapes the edge of the underfill, therefore it inherently has a high affinity. Furthermore, the underfill inherently possesses capillary forces (attraction forces) and therefore has a high affinity.

(e) the invention was described in-

(1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or

(2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

13. Claims 9, 10 and 12 are rejected under 35 U.S.C. 102(e) as being anticipated by Inaba (JP 63-62362).

14. Inaba (Fig 1a,b and 2) discloses a method for packaging an integrated circuit die comprising inherently attaching a die ("semiconductor element," 14) to a substrate (11) so that conductive traces on the substrate (not labeled; shown in Fig 1a) electrically contact contacts (not labeled, balls formed on trace) on the die, forming dam (13) on the substrate and filling ("injected") a volume between the die and substrate and between the die and the dam with an underfill material (15), wherein the forming the dam comprises depositing a flexible material ("expanding material") on the substrate and curing (heated and hardened) the material to form the dam.

15. In regards to claim 12, the substrate has an inherent treated region (portion of substrate that dam is formed on) that confines and shapes the edge of the underfill,

therefore it inherently has a high affinity. Furthermore, the underfill inherently possesses capillary forces (attraction forces) and therefore has a high affinity.

***Claim Rejections - 35 USC § 103***

16. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

17. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

18. Claims 5 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jones et al. (U.S 5,541,450).

19. Jones does not appear to explicitly disclose that the dam's width, however it would have been an obvious matter of design choice bounded by well known manufacturing constraints and ascertainable by routine experimentation and optimization to choose these particular dimensions because applicant has not disclosed

that the dimensions are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical, and it appears prima facie that the process would possess utility using another dimension. Indeed, it has been held that mere dimensional limitations are prima facie obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical. See, for example, *In re Rose*, 220 F.2d 459, 105 USPQ 237 (CCPA 1955); *In re Rinehart*, 531 F.2d 1048, 189 USPQ 143 (CCPA 1976); *Gardner v. TEC Systems, Inc.*, 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied, 469 U.S. 830, 225 USPQ 232 (1984); *In re Dailey*, 357 F.2d 669, 149 USPQ 47 (CCPA 1966).

20. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Inaba as applied to claim 1 and further in view of Quan et al (U.S 2002/0053452).

21. Inaba does not appear to disclose forming the dam on the substrate by preforming the dam and then attaching the preformed dam to the substrate, however Quan forms a dam by preforming a dam and then attaching the preformed dam to a substrate.

22. It would have been obvious to one of ordinary skill in the art to form the dam of Inaba by pre-forming the dam and then attaching it to the substrate in order to provide an alternate method of providing an art recognized equivalent dam, and the selection of any of these equivalents to form a dam would have been within the level of ordinary skill in the art.

### ***Conclusion***

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23. Any inquiry concerning this communication or earlier communications from the examiner should be directed to James Mitchell whose telephone number is (703) 305-0244. The examiner can normally be reached on M-F 10:30-8:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David L. Talbott can be reached on (703) 305-9883. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 305-3432 for regular communications and (703) 305-3230 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.



jmm  
May 31, 2002



DAVID E. GRAYBILL  
PRIMARY EXAMINER